Southern New Hampshire University

Storm and Climate Data Record (SCDR)

Implementation Plan

Date of record:
Jan 1, 2017 to Dec 1, 2019

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I. Introduction

1.1 Overview and purpose

The purpose of this report is to further analyze storm and crime data in the city of Miami. The Miami Police Department previously requested the creation of a Storm and Crime Data Report (SCDR) to investigate a link between an increase in crimes with storms. Now they have requested a SCDR that analyzes the increase in crime costs while storms are occurring.

1.2 Define why you need data analysis

The analysis is needed to investigate the rising costs of crimes during storms. This analysis can then provide the police department with information on the next possible string of crimes. The ability to properly prepare for future incidents will allow for more accurate resource allocation and improved response quality. With this improved efficiency, there is greater potential for reducing monetary loss during future storm events.

II. Data Preparations

2.1 Name data sources

The data source being used for this analysis was provided by the Miami Police Department. This source includes historical data from January 1st, 2017, to December 1st, 2019 that contains information pertaining to crimes and storms that have occurred in the city of Miami.

2.2 Filter through unnecessary data

Due to the focal point of the analysis, any data concerning the specifics of the crime and storm event not related to monetary loss or data occurred is not necessary.

2.3 Define your parameters

The parameters for this analysis are dates of crimes when no storms occurred, dates of crimes when storms occurred, and the monetary loss associated with each.

2.4 Identify measurement priorities

To ensure that the analysis performed is accurate and relevant it is important to narrow the focus of the investigation. According to Siu (2023), it is important to "identify the core metrics that align with [the] objectives." That means, with the focus of the investigation being on monetary losses accrued in comparison to crimes during storm events and crimes that occurred without storm events, those are the metric priorities.

2.5 Ensure collected data fits the need

The historical data provided by the Miami Police department fits the needs of the analysis listed above. It provides data over a period of close to three years allowing for more accurate prediction abilities. It also provides both instances of crimes where monetary loss occurs, which furthers the investigation into the impact of crimes during storms on a victim's monetary loss compared to the impact of crimes without storm events.

III. Data Analysis

3.1 Identify scripts used

The scripts used for this analysis with explanations are as follows:

```
install.packages("tframe");
install.packages("tfplot");
library("tframe");
library("tfplot");
```

These lines install the time-series packages required for the analysis as well as calling them into use within the script.

```
setwd("C:/Users/Public/Desktop/DAT-375")
```

This line is used to set the working directory.

```
crimestormdataQ <- read.csv("crimeStormQ.csv")
print(crimestormdataQ)
crimenostormdataQ <- read.csv("crimenostormQ.csv")
print(crimenostormdataQ)
```

These four lines of script write the information from the provided csv documents into a dataframe that can be manipulated in the R program. They also print out the imported csv document contents for each as shown in Figure 1.

```
> print(crimestormdataQ)
         Date    Loss
1   1/1/2017 1419.55
2   2/1/2017   94.41
3   3/1/2017 1190.12
4   4/1/2017 1368.38
5   5/1/2017  371.58
6   6/1/2017  644.34
7   7/1/2017 1983.50
8   8/1/2017  530.02
9   9/1/2017 1723.21
10 10/1/2017 1063.26
11 11/1/2017  744.69
12 12/1/2017 3100.73
13  1/1/2018 1221.51
14  2/1/2018 2732.90
15  3/1/2018 1416.27
16  4/1/2018 1437.69
17  5/1/2018 2159.85
18  6/1/2018 1765.75
19  7/1/2018 3171.21
20  8/1/2018 1520.01
21  9/1/2018 1029.26
22 10/1/2018 2034.41
23 11/1/2018 1064.83
24 12/1/2018 1008.87
25  1/1/2019 1013.16
26  2/1/2019  936.96
27  3/1/2019 1435.58
28  4/1/2019 1045.95
29  5/1/2019  921.73
30  6/1/2019  935.21
31  7/1/2019 2609.65
32  8/1/2019  872.95
33  9/1/2019 1023.65
34 10/1/2019  972.88
35 11/1/2019 1843.33
36 12/1/2019 1970.23
> print(crimenostormdataQ)
         Date    Loss
1   1/1/2017    0.00
2   2/1/2017    0.00
3   3/1/2017   65.76
4   4/1/2017    0.00
5   5/1/2017    0.00
6   6/1/2017  665.65
7   7/1/2017  110.67
8   8/1/2017 1524.90
9   9/1/2017  122.18
10 10/1/2017    0.00
11 11/1/2017  157.19
12 12/1/2017  773.37
13  1/1/2018  678.38
14  2/1/2018    0.00
15  3/1/2018    0.00
16  4/1/2018  648.67
17  5/1/2018  545.91
18  6/1/2018  842.42
19  7/1/2018  928.58
20  8/1/2018  361.90
21  9/1/2018  387.95
22 10/1/2018    0.00
23 11/1/2018  126.79
24 12/1/2018 1073.05
25  1/1/2019  753.82
26  2/1/2019  165.23
27  3/1/2019 1381.25
28  4/1/2019  804.80
29  5/1/2019    0.00
30  6/1/2019 1471.61
31  7/1/2019  431.67
32  8/1/2019 1102.97
33  9/1/2019  766.18
34 10/1/2019 1397.89
35 11/1/2019  832.48
36 12/1/2019    0.00
```

Figure 1: Output from print scripts

```
z<-ts(cumsum(crimestormdataQ$Loss)/1000,start=c(2017,1), frequency=12)
x<-ts(cumsum(crimenostormdataQ$Loss)/1000,start=c(2017,1), frequency=12)
```

These two lines of script are used to create time-series objects. Getting the cumulative sum value of the loss from each previously created data frame and dividing it by 10. They also specify at what point in the data to begin observations and how often.

```
tfplot(z,x,
    ylab="Victim Loss in K$",
    xlab="By Month by Year",
    title="Victim Loss From Crimes for Jan 2017 - Dec 2019",
    subtitle = "Cumulative Loss in Thousands of Dollars",
    legend=c("Crimes During Storms (black)", "Crimes When No Storms (red)"),
```

source="Source: DAT Data")

Finally, these seven lines are code are used to create the visualization shown in Figure 2. With the x-axis showing the date and the y-axis showing the monetary loss of crimes during storms and crimes when there are no storms.

3.2 Run the scripts to analyze the data and validate the output

After running the scripts, it can be noted that a dual line graph (Figure 2) was output showing the cumulative monetary loss over the course of nearly three years. One line shows the cumulative loss from crimes that occurred during storms while the other line shows the cumulative loss from crimes that occurred when there were no storms. This was the intended output of the written scripts.

IV. Drawing Conclusions

4.1 Present the results of the analysis to stakeholders

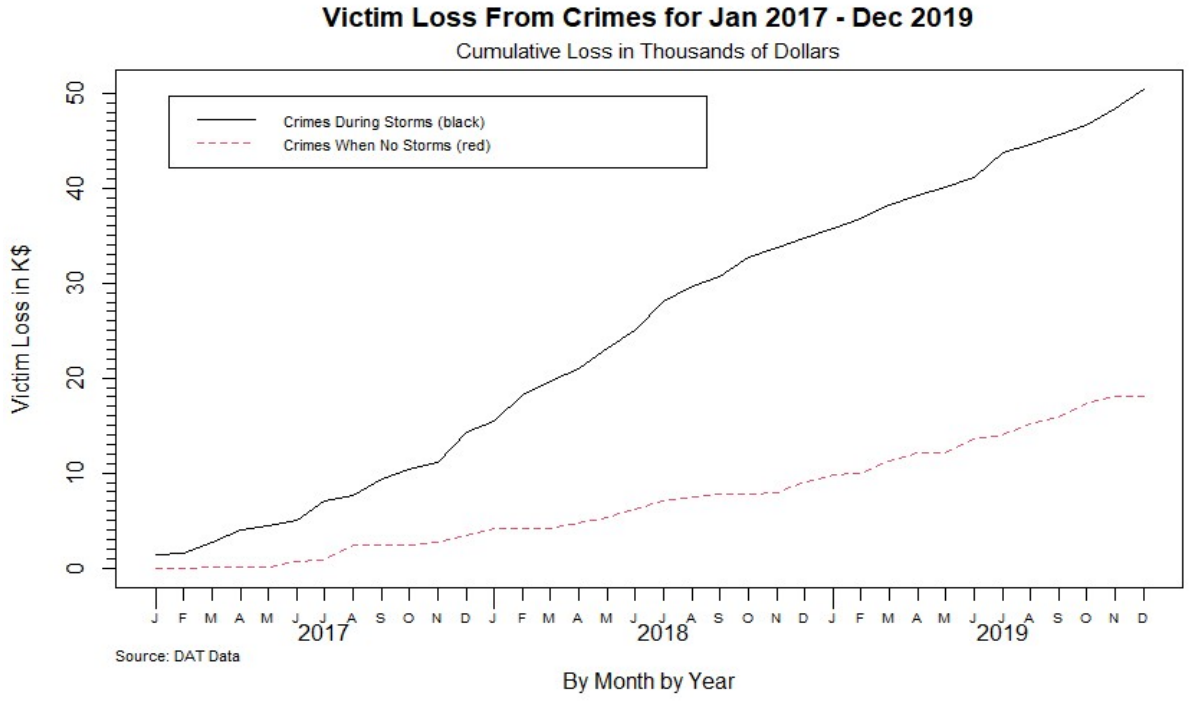

Figure 2: Victim Loss From Crimes

Examining the dual line graph (Figure 2), it can be noted that the line that represents crimes that occur during storms (black) is always above the line that represents crimes that occur when there are no storms (red). These lines visualize the cumulative trend in monetary loss from January 1st, 2017 to December 1st, 2019. These lines separate from each other drastically, the cumulative monetary loss for crimes that occurred during storms reaching approximately $50k, while the cumulative monetary loss for crimes that occurred when there were no storms only reaches approximately $17k, a $32k difference.

4.2 Determine whether the problem was addressed, including any challenges and limitations

This analysis does address the problem proposed by the Miami Police Department. It shows the monetary loss that has occurred over the span of almost three years, with crimes occurring during storms having more monetary loss. The main challenge and limitation of this analysis is the lack of depth. Further analysis is needed to determine what is impacting the increase in monetary loss for crimes that occur during storms. This increase in loss could either be attributed to more loss from the crime due to vulnerabilities or it could be attributed to the damage incurred by the storm. Therefore, even though the analysis properly addresses the problem proposed, it would greatly benefit from an additional analysis regarding the cause of the loss.

4.3 Report potential new findings

These new findings can potentially assist in predicting how much loss might occur during the next storm. This is because there is a clear upward trend in the cumulative loss, with the cumulative loss for crimes occurring during storms increasing at a far faster rate than crimes without storms. With the use of further analysis to determine what crimes have a higher likelihood of occurring during storms, the Miami Police Department can curate plans for deterring those crimes.

References

Siu, E. (November 22, 2023). *Which Measurement and Data Should You Prioritize in Marketing?* Single Grain. Retrieved from https://www.singlegrain.com/blog/ms/measurement-and-data/